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Effect of Flooding on Emerged Soybeans

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The excessive amount of rainfall that we have received in Iowa over the last 2 months, and particularly the last week, has caused excessive flooding in many areas. River bottoms are completely flooded and will probably not be able to be planted now for the next 2 to 3 weeks or at all this year. For the majority of the fields the water should drain and dry quickly, barring no more excessive rainfall.

The most common question I got this week was about soybean responds to water logging or poor aeration associated with floods. Standing water in low-lying fields can result in significant soybean yield reduction and can last many days due to lack of soil permeability or surface drainage. The extent of flood damage on plants is related to the temperature of the water, the amount of water motion and the duration of the flood.

Flooded Iowa soybean field, May 2008.

Soybean prefers adequate soil oxygen for maximum productivity. Oxygen content of water is much lower than air therefore saturated soils and flooding reduces the amount of oxygen available to the plant. Research has shown that oxygen concentration can be close to zero after 24 hours in flooded soil, depending on water movement. Without oxygen, the plant cannot perform important functions like respiration, an important function of plant growth.

We know that the temperature will influence the speed of respiration so high temperatures will be more detrimental since the faster the respiration is "running" the faster the oxygen is depleted and the plants then start rotting. Cool, cloudy days and cool, clear nights increase the survival of a flooded soybean crop.

Right now the chance for stand loss is high simply because of our high temperatures. Research from Minnesota shows that flooding for 6 days or more may result in a significant yield loss or loss of the entire crop. With our current temperatures in the 80s, soybean plants may only survive a few days.

Ohio researchers also found that plants in flooded fields are injured from a buildup of toxins and carbon dioxide, which is up to 50 times higher in flooded soils than in non-flooded soils. They concluded that plants are more injured from the buildup of carbon dioxide than from lack of oxygen.

Finally, flooding can leave silt deposits and crop residue that can bury the crop and significantly reduce photosynthetic capacity. Without rainfall to wash silt form the leaves, recovery is greatly reduced. It is important to remember that fields subjected to flooding also are more susceptible to nitrogen and other plant nutrient deficiencies and to some

root rot diseases, including Phytophthora root rot. If damping-off occurs from Phytophthora root rot, and replanting is needed, it is highly recommend using a seed treatment with excellent control of Phytophthora root rot.

Remember that seedbed conditions should be good whether you are planting in April or June and it is highly recommended to wait until the soil is dry before taking heavy machinery into the field. Soil compaction contributes to reduced root growth and may reduce yield significantly. Since yield potential is already reduced from the delayed planting, we want to be sure that the plant is the in the best conditions as possible.

On the other hand we also know that at some point it may become necessary to work and plant fields on the wet side since the delay in planting soybean will cause more yield loss than will poor soil conditions. However, I do not see us to be in that situation for the next 2 weeks.

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Category: Crop Production

Crop:
Soybean

Tags: flooded sites